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REVIEW

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Pragmatic strategies to address health disparities along the continuum of care in chronic liver disease

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Abstract

Racial, ethnic, and socioeconomic disparities exist in the prevalence and natural history of chronic liver disease, access to care, and clinical outcomes. Solutions to improve health equity range widely, from digital health tools to policy changes. The current review outlines the disparities along the chronic liver disease health care continuum from screening and diagnosis to the management of cirrhosis and considerations of pre-liver and post-liver transplantation. Using a health equity research and implementation science framework, we offer pragmatic strategies to address barriers to implementing high-quality equitable care for patients with chronic liver disease.

INTRODUCTION

The burden of chronic liver disease (CLD) continues to rise, leading to significant morbidity and mortality, with increasing costs and exponential health care spending.^[1–3] Although there are clinical guidance documents and systems in place to track the quality and outcomes of CLD care, these measures are predominantly focused on late-stage management rather than upstream prevention of advanced disease.^[4] Taking a public health approach to identify and address CLD risk factors would affect more people and potentially modify CLD-associated outcomes. However, there are many factors related to an individual's care that can be influenced by the health disparities that a patient encounters during the road to potentially curative treatment or reversal of disease through appropriate management. Furthermore, the gap between evidence-based and actual treatment is partly explained by social determinants of health (SDOH) and biases in society.

Highlighting CLD disparities, their roots, and consequences are fundamental to improving liver health

outcomes, and numerous studies and articles have identified how racial, ethnic, and social constructs play a role in CLD care.^[5–8] Health equity approaches at the local, national, and global levels are needed to overcome these challenges, along with accepting responsibility (ie, not just equity tourism) to address disparities for patients with CLD.^[9] Herein, we present a comprehensive review summarizing health care disparities along the CLD care continuum, while providing tangible solutions within each phase of care (Table 1, Figure 1).

SCREENING AND DIAGNOSIS: ALCOHOL-ASSOCIATED LIVER DISEASE AND METABOLIC DYSFUNCTION–ASSOCIATED STEATOTIC LIVER DISEASE

The problem

Screening for CLD has primarily focused on identifying and stratifying at-risk populations.^[10] However, the most effective screening programs occur within primary care,

Abbreviations: AASLD, American Association for the Study of Liver Diseases; ALEH, Latin American Association for the Study of the Liver; APASL, Asian Pacific Association for the Study of the Liver; ArLD, alcohol-related liver disease; AUDIT-C, Alcohol Use Disorders Identification Test-Consumption; CLD, chronic liver disease; DC, decompensated cirrhosis; EASL, European Association for the Study of the Liver; EHR, electronic health record; FIB-4, Fibrosis -4; HHS, Department of Health and Human Services; LT, liver transplantation; MASLD, metabolic dysfunction–associated steatotic liver disease; PC, palliative care; PCP, primary care physician; SDOH, social determinants of health; SES, socioeconomic status; SOLDA, Society on Liver Disease in Africa; USPSTF, United States Preventive Services Task Force; WHO, World Health Organization.

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TABLE 1 Established barriers to chronic liver disease management leading to health care disparities

Underserved populations	Evidence-based recommendations	Existing data	Barriers to equity
Hepatitis C	Universal screening of baby boomers	Black, Hispanic, Asian, and young women less likely to be screened	Lack of patient and provider education along with poor access to health system/provider
Hepatitis B	Vaccination recommended for all persons	Rates of HBV screening and vaccination are lowest in socioeconomically disadvantaged groups (race, education, and income)	Lack of patient and provider knowledge confounded by patient language barriers and disease stigma
Metabolic dysfunction–associated steatotic liver disease	Population-level screening for MASLD is not recommended currently	Type 2 diabetes, obesity, and social vulnerability factors (education, poverty, health insurance, and access to health care) higher among minority groups	Absence of access to preventative health care services
Alcohol-associated liver disease	Patients in primary care and outpatient clinics should be screened routinely for alcohol use disorder using validated questionnaires	Higher prevalence among racial/ethnic minorities and gaps in screening of AUD	Lack of pharmacotherapy, access and community supports in a group or individual setting
Cirrhosis	Population-based screening with labs and elastography is not recommended at this time	Underinsured and uninsured without any access Patients at risk for other forms of liver disease (eg, MASLD)	Lack of early detection before decompensation, low rate of screening for portal hypertension, and liver cancer
HCC	Screening for persons with cirrhosis and HBV with high-risk factors	Neighborhood disadvantage along with Black and Hispanic persons associated with increased HCC risk and late-stage diagnosis	Providers failing to identify at-risk populations and order tests Fragmented care with patients failing to complete screening tests
Liver transplantation	Patients with a MELD-Na score > 15, or exception pathway candidate are referred for LT referral, if applicable	Black and Hispanic patients less likely to be referred or waitlisted for LT due to less access to health care, lower socioeconomic status, and lower health literacy Black patients comprise only 20% of recipients of LT and have worse graft and overall transplant survival	Lack of transparent data of patients as well as centers and OPO performance (improving with recent efforts) Lack of standardized referral and incentives to refer Low acceptance of living donor liver transplant (compared to other nations)
Palliative care	Early referral reduces health care utilization and aids in documenting advance care planning	Late referrals for minority patients to receive full benefits of PC Limited number of PC providers	Lack of systematic screening tools to identify patients with inpatient PC needs as well as outpatients with PC demands, focusing on those who would benefit from outpatient hepatology and specialty PC coordinated clinical visits
Pediatrics	Appropriate referral for LT according to PELD score	Black and Hispanic children have delayed listing, increased waitlist mortality, and less likely to receive LDLT Non-standard exceptions criteria used less often in non-White populations Non-Whites and unfavorable SES populations less likely to participate in health care transition	Impact of patient/caretaker health literacy on long-term outcomes Impact of addressing social adversity on long-term outcomes
Sexual and gender minorities	Use of inclusive language and pronouns	Incidence of HAV, HBV, and HCV is higher due to underuse of vaccinations Higher rates of hazardous alcohol use	Providers implicit bias on the decision-making process (eg, LT) Limited data on outcomes of LT and gender affirming therapy on CLD

Abbreviations: AUD, alcohol use disorder; CLD, chronic liver disease; LDLT, living donor liver transplant; LT, liver transplantation; MASLD, metabolic dysfunction–associated steatotic liver disease; MELD, model for end-stage liver disease score; OPO, organ procurement organization; PC, palliative care; PELD, Pediatric End-Stage Liver Disease score; SES, socioeconomic status.

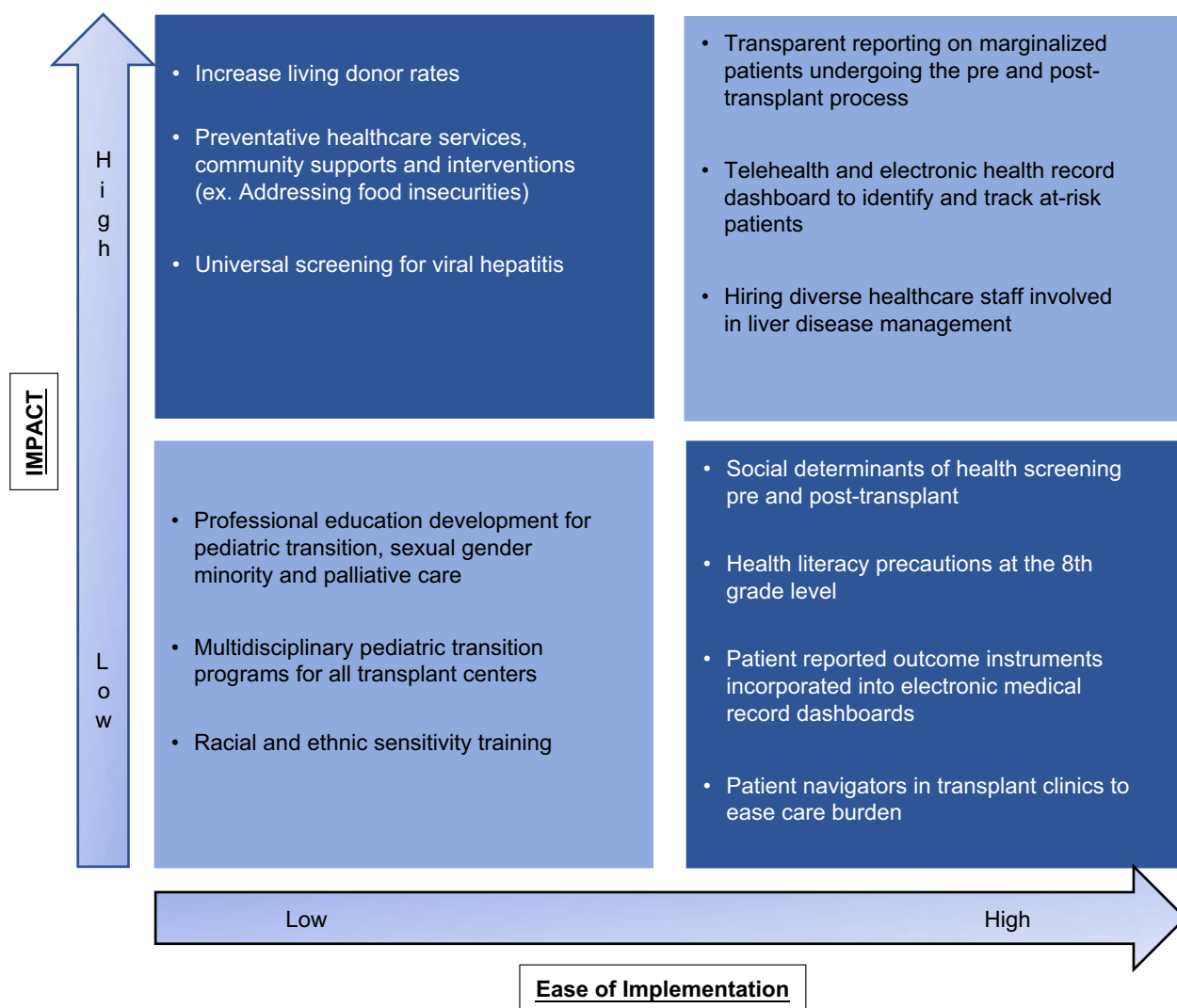


FIGURE 1 Selected implementation strategies to address health care disparities in chronic liver disease.

making them challenging to address among subspecialists in hepatology. Thus, the role of hepatology in CLD screening is to inform guidelines and protocols of the health care system. Current guidelines do not recommend routine screening for CLD, mainly due to uncertainties surrounding diagnostic tests and treatment options. Screening for alcohol-associated liver disease (ALD) and metabolic dysfunction–associated steatotic liver disease (MASLD) (eg, pre-diabetes/diabetes) is endorsed by the US Preventive Services Task Force (USPSTF).^[11–13] However, these guidelines do not consider how vulnerable populations can be at a higher risk of disease and may be appropriate for increased or more targeted screening. For example, for both ALD and MASLD, ethnic minorities (ie, Blacks and Hispanics) have higher rates of disease due to lifestyle factors, such as living in lower socioeconomic status (SES) neighborhoods with unhealthy food choices, as well as genetic predisposition (higher prevalence of PNPLA3 gene mutation in the case of MASLD), which

may be exacerbated by low awareness of risk factors, further highlighting the difficulty in addressing disparities.^[14–17]

System-level changes

Several studies evaluating multiple outreach and screening methods for MASLD and ALD (eg, FIB-4, shear wave elastography, or a combination of FIB-4 and vibration-controlled transient elastography) showed a reduction in referral volumes, thereby providing easier access to those in need. However, the acceptability of patients with various SDOHs has not been completely documented.^[18–25] In addition, applying clinical decision support systems can help improve the delivery of guideline-concordant care for patients with ALD or MASLD.^[26] Clinical decision support system platforms leveraging clinician reminder systems have been effective strategies within hepatology for dispelling

health care inequities; however, clinical decision support system focused on alerting providers requires a fine balance between timely, clinically relevant delivery of guidance, and mitigation of alert fatigue.^[27] Nevertheless, MASLD and ALD represent ideal cases for informatics-based solutions in care management. For example, in a prospective study of primary care patients diagnosed with MASLD, an embedded electronic health record (EHR) algorithm could automate the simultaneous detection and risk stratification of these patients using FIB-4 calculations of pre-existing data during their primary care visits.^[28] In addition, EHR-based mechanisms to guide targeted outreach efforts for high-risk individuals, such as primary care patients with diabetes and elevated FIB-4 scores (MASLD) or the use of the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) questionnaire (ALD), can facilitate the detection of patients at greatest risk of having advanced fibrosis and direct them toward further directive care.^[29,30] Unfortunately, a barrier to the success of these methodologies is the often-limited documentation of MASLD or ALD diagnoses within the patient; thus, mechanisms that rely on the documentation of diagnostic codes can perpetuate disparities in care delivery.^[31–33] Nevertheless, clinical informatics offers an opportunity to organize unstructured data using EHR-based algorithms or natural language processing to identify patients in a more systematic (and less opportunistic) way.^[34] Techniques such as these can merge the management of EHR data into both structured and unstructured formats to provide promising solutions for advancing equitable care.

Policy-level changes

To address ALD and MASLD at the population level, changes must target broader structural concerns that increase the risk factors for new cases. A strong area for outreach concerns policies instead of alcohol availability. Population-wide interventions to reduce access include increasing alcohol taxes, minimum unit pricing, implementing regulations to reduce alcohol availability/sales, electronic screening, brief interventions, and offering effective preventative interventions tailored to the patient.^[35–40] Regarding drivers of MASLD, the Community Prevention Services Taskforce also targets adult obesity by recommending worksite interventions and technology-supported multi-component coaching or counseling interventions along with diet and physical activity promotion programs and interventions engaging community health workers.^[41–45] However, an isolated focus on improving risk factor mitigation may not translate into meaningful reductions in disparities, as minoritized at-risk groups often have large gaps in access to high-quality and culturally informed medical care, such that any health care–

based intervention may fail to reach the most vulnerable and track their impact.^[46–48] Bridging these gaps in care involves a focus on considering minority and marginalized perspectives in policy generation while focusing on how these barriers impact different communities in different ways.

Knowledge gaps

Ongoing questions remain to address our understanding of how SDOH factors influence our capacity to screen and detect ALD and MASLD, particularly within highly prevalent diseased populations. Further investigation is needed to study refined screening models that are less influenced by SDOH and that can accurately identify patients at the community and health system levels. Although there are studies that support the use of universal screening for alcohol misuse in admitted patients to identify patients at high risk of ALD, there is a paucity of literature regarding how often this occurs outside of intentional research programs and whether these questions are asked differently or as frequently in vulnerable and marginalized populations.^[49] Furthermore, these studies often suffer from cultural and language barriers when attempting to communicate with the target population, thus further limiting our understanding of the target population, which is a critical factor in the psychosocially complex relationship that many patients have with alcohol misuse.

MASLD itself presents a challenge for screening uptake; recognizing the role of screening often falls to primary care physicians (PCPs), and hepatologists only become involved later in the continuum of care. Multiple studies have identified limitations in the confidence of PCPs when dealing with CLD, including limited knowledge of screening in previous NAFLD denominations and a reactive mental model for CLD care.^[50,51] As we transition to a new nomenclature (NAFLD to MASLD) and workflow for identifying CLD, there is a significant need for research to appreciate how this impacts the perspective of PCPs involved in CLD care, who are now required to understand a different workflow beyond their comfort levels. Given that marginalized populations already experience lower rates of screening, any identifiable knowledge or confidence gaps must be targeted to maintain and improve the crucial role these physicians play in CLD care.

VIRAL HEPATITIS

The problem

Disparities in viral hepatitis screening persist worldwide. Although HCV screening is the cornerstone of elimination efforts, less than half of Americans are aware of

being infected.^[52] Furthermore, Black and Hispanic patients are less likely to be screened than White patients and women and are less likely to be screened than men.^[53] These inconsistencies in screening are reflected in the outcomes that minority patients experience regarding treatment success and adverse events after HCV diagnosis, emphasizing the importance of inequities in screening along the continuum of liver disease.^[54,55] In parallel, screening and vaccination for HBV, which disproportionately affects Asian and African-born people, are lowest in those residing in lower SES quartiles.^[56,57] These points highlight that, in the earlier stages of liver disease, inequities in the health care system appear to stem from inequities in social structures. Consequently, minority and marginalized populations experience poor screening adherence and screening-associated outcomes, inherently creating a barrier to future prognosis as their liver disease progresses.^[22]

System-level changes

Owing to the benefits of earlier diagnosis, population-level interventions have evolved to outline high-risk populations within their own health systems. For example, the Veterans Affairs HCV elimination program used the tenets of care coordination and communication to build a registry of patients with HCV, with eventual dissemination of evidence-based guidelines to frontline clinicians and resource centers to enhance treatment rates.^[58] However, transparent and accurate reporting is needed in such programs to avoid unintended exacerbation of disparities related to program implementation (eg, implementation in the private health sector). Moreover, screening interventions at the community level have been the most effective in increasing viral hepatitis screening in marginalized populations. For example, the University of California San Francisco's DeLIVER Care Van is a mobile unit providing HCV screening and treatment to people experiencing homelessness in San Francisco.^[28] This grassroots effort has been effective in increasing screening among people who inject drugs and are marginally housed by bringing these services directly to them. Other successful interventions within safety-net systems for increasing HCV screening include EHR-integrated alerts for primary care providers, mailing letters with HCV screening lab orders directly to patients, and combining screening with other preventive health services such as HIV testing and colon cancer screening visits.^[29,30] Similarly, point of care testing for HBV has also been effective when used in large-scale screening programs for HBV in low-resource settings and high-risk but difficult-to-reach populations (i.v. drug use patients and sex workers). For example, a screen and linkage-to-care community-based outreach study

conducted in India led to 7700 vaccinations and 162 people receiving guideline-directed treatment.^[49] Thus, if screening practices focus on increasing accessibility for high-risk populations, they may be able to improve both the rate of diagnosis and clinical outcomes after diagnosis, as care adherence increases.

Policy-level changes

Identifying at-risk populations requires a multiprong approach that relies on (1) awareness and education at the patient and provider levels, (2) access and linkage to screening and specialized services, and (3) engagement and ownership to mitigate the disease burden at the health care system, state, and national levels, that is, the health impact pyramid.^[59,60] Although targeting the entire population at risk for viral hepatitis may be difficult, concentrating on select groups at the highest risk may be a step forward with the backbone of such efforts being the PCP-specialist interaction. Partnerships and grants are required for state health departments to offer services to medically underserved populations. Linkage to virtual consultations to groups of engaged providers (eg, Project ECHO) and its variations (eg, VA scan echo) may serve as effective templates along with standardizing opt-out or mandatory screening programs at multiple levels of intervention (community, hospital system, and society) targeting at-risk populations (ie, for HCV, incarcerated persons, and people who inject drugs; for HBV, Asian, and African immigrant populations).^[61]

Knowledge gaps

The expansion of screening guidelines to recommend HCV and HBV screening at least once in a lifetime for all adults will move the World Health Organization (WHO) closer to its viral hepatitis elimination goals.^[62–64] A key aspect of completing this is to understand how the key drivers of limited screening impact different populations. For example, there are very few countries mandating screening for viral hepatitis in patients before immigration, despite a high proportion of immigrants coming from a region with a high prevalence.^[65] Furthermore, although our understanding of barriers to primary care access for immigrant populations is growing,^[66–68] there is still limited information exploring the distinct relationship between access to care and viral hepatitis screening in these patients, such as exploring the duration of follow-up from the initial visit to screening and what prompts screening in these cases. Exploring these concepts through survey-based and qualitative studies can help inform decisions that drive policy-based and system-based changes. Similar gaps exist in nonimmigrant

Latin and African-American populations,^[55] and ultimately, a more granular understanding of whether these gaps result from barriers in communication, accessibility, or provider confidence needs to be invested as an area of focused research.

CIRRHOSIS

The problem

It is estimated that half of the patients with cirrhosis are unaware of their diagnosis.^[69] One potential factor is that patients with less access to high-quality medical care are more vulnerable to inadequate screening or diagnostic testing. This is supported by trends seen in diagnosis, such as patients seen in safety-net health care systems often presenting in later stages of the disease and experiencing poorer outcomes.^[70] Furthermore, as the burden of CLD shifts toward nonviral etiologies (ALD and MASLD), there has been an increased rate of hospitalizations over time, with a shift toward sicker and older patients with multiple chronic medical conditions.^[71] For example, the traditional complications of portal hypertension (eg, variceal bleeding) are supplanted by infection and renal failure, making CLD hospitalizations costly and deadly, with a mortality rate of up to 30%.^[72,73] Similarly, patients with CLD experience a high burden of readmission rates, and focused research to reduce readmission rates has been impactful by refining workflow (ie, checklists and decision support tools) or arranging close (<30 d) outpatient follow-up.^[74,75] However, these interventions primarily focus on physician factors that do not specifically address the diversity of patients with CLD. For example, Black patients living with cirrhosis experience a greater number of admissions and 30-day and 90-day readmission rates with the synergistic effects of race, income, and insurance status disparities (eg, a higher rate insured by Medicaid).^[76–78] To further complicate factors, it is well known that patients of minority race are more likely to be admitted to safety-net hospitals, as they are likely to be uninsured.^[79] Unfortunately, patients with CLD admitted to hospitals servicing mostly minority patients have an increased risk of mortality, which may be related to stressed care environments/infrastructure, high nursing workload, and other environmental factors that can significantly impact patient outcomes.^[80,81]

System-level changes

Health systems remain overburdened with cirrhosis-related hospitalizations and health care spending

continues to increase exponentially.^[72] Early EHR-initiated physician reminders and order checklists have been used to improve care delivery for hospitalized patients with cirrhosis.^[74] Furthermore, compliance with societally reported quality indicators has demonstrated higher survivability for these patients as well as higher access to curative approaches such as liver transplantation (LT).^[82] In addition, specialized care pathways for patients transitioning from the hospital to the hepatology clinic (advanced practice provider–led clinics) with a rapid turnaround (usually within 7 d of discharge) have demonstrated reduced early readmissions.^[83] Furthermore, to keep patients with decompensated cirrhosis (DC) out of the emergency room and hospitals, some international groups have revealed the concept of an “outpatient hospital” model. This model allows patients with ascites to have immediate access to large-volume paracentesis; those with HE have immediate access to lactulose therapy, along with easy access to endoscopy for variceal surveillance.^[75] While these models remain difficult to mimic in the United States due to the complex financial constraints of reimbursement, efforts are ongoing to achieve delivery constructs that can effectively prevent hospitalization for many patients with cirrhosis. Unfortunately, nearly all efforts are occurring at large academic centers which leave out the “iceberg” size of the cirrhosis population admitted to community hospitals who lack these valued initiatives. Thus, disparities in cirrhosis care are exacerbated at the national scale.

Policy-level changes

Extending beyond national disparities in cirrhosis care, there is a global disparity in how patients experience care for cirrhosis. The CLEARED consortium, an international comparison of inpatient care for cirrhosis, highlights global disparities in care, and patients from low-income or median-income countries were more likely to be at risk for inpatient mortality and death within 30 days after discharge, even after accounting for other variables associated with the severity of liver disease.^[84] Ultimately, some of these disparities can stem from the limited infrastructure to support timely and essential services for these patients, such as disparities in prophylactic medication availability, emergency endoscopy, and diagnostic tools. Strong advocacy is required to strengthen the supportive care for these patients. A similar push was seen in the development of World Hepatitis Day through the World Health Organization,^[85] which spurred a conversation, resulting in numerous international efforts to better screen and address hepatitis in local populations. A measure that could be similarly beneficial is the international alliance of the AASLD, EASL, APASL, SOLDA, and ALEH to propose World Liver Day to the

WHO, initiated in 2023.^[86] Such measures can hopefully generate a similar interest regarding liver health and cirrhosis management, potentially driving the funding needed to better address cirrhosis care on a global scale.

Knowledge gaps

There are limitations to the ability of a physician to understand a patient's needs; hence, the investigation of how to use, incorporate, and assess patient-reported outcomes based on disease entities has been welcomed.^[87,88] However, we need to acknowledge that grouping uniform needs based on a disease entity may vary according to age, sex, culture, and underlying pathology of the disease.^[89] Similar frameworks are crucial for understanding how patients experience diseases differently and have different goals based on culture and SDOH contexts. Future studies must consider these factors in an effort to bolster patient outcomes and address the longitudinal therapeutic relationship formed over the care of patients with cirrhosis, which can often last up to a decade. SDOH drivers, such as cultural sensitivity for etiologic liver disease, medical mistrust, and implicit biases, continue to prevent advancement in universal health care equity. Ongoing outreach with community champions, diverse provider teams, and ongoing engagement with the government through societal health care efforts are needed to destigmatize cirrhosis and convince those at risk of seeking care.

HCC

The problem

HCC screening is recommended every 6 months in patients living with cirrhosis and those infected with HBV exhibiting high-risk features, such as age and family history. Prior data have identified that neighborhood disadvantages may be associated with an increased incidence of HCC, which is most prevalent among Asian and Pacific Islander populations.^[90] Black, Hispanic, and rural populations are also at risk for screening deprivation and later stages of diagnosis.^[91–93] Similarly, HCC screening is less common among patients with HBV than among those with cirrhosis, and at-risk populations include more immigrants, as well as Black and Hispanic persons.^[94] Ultimately, marginalized populations have poorer outcomes after the diagnosis of cirrhosis and are more likely to face adverse outcomes related to this disease, from both a hospitalization perspective as well as limitations to prevent further adverse outcomes, such as the diagnosis of HCC.

System-level changes

HCC screening programs for high-risk patients consistently detect early-stage cancer, thus allowing opportunities to provide effective or even curative therapies.^[95] However, SDOH factors negatively influence access to HCC screening and surveillance protocols; therefore, patients from lower SES classes or public insurance have experienced significant rates of late-stage cancer diagnosis and delayed treatment, leading to inferior cancer outcomes.^[96] However, initiatives leveraging and expanding telehealth along with EHR dashboards that may help those vulnerable to access issues without compromising outcomes for HCC are promising, as they have the potential to mitigate provider and system barriers to HCC surveillance and care at the system level.^[97–99]

Policy-level changes

HCC screening may be a target for an outreach strategy in which all individuals within a defined population of interest receive a screening promotion intervention regardless of a scheduled health care visit. An example includes patient navigation or case management to help schedule and complete ultrasound after referral for HCC screening.^[100] The strength of this type of strategy is that it may be centralized and delivered with a high volume by a small set of staff dedicated to the program. However, the lack of randomized controlled data showing that HCC surveillance impacts survival has led to a lack of national screening recommendations; thus, it has been limited to hepatology guidelines, which have a limited scope in reaching a larger population of providers.^[95,101–103]

Knowledge gaps

Although there is a strong foundation for research regarding disparities in HCC surveillance and concerns at the outset of diagnosis, limited information exists regarding the financial burden of surveillance and treatment to patients. Often viewed exclusively from the lens of the system burden, involvement in such programs does have an opportunity cost to patients as well, which can further exacerbate existing socioeconomic fault lines of care. Studies exploring the financial burden patients face through surveillance and further understanding how surveillance impacts patients are crucial to ensuring adherence to HCC surveillance and the net benefit of the program to the patient.^[104] Methods to improve surveillance can be targeted to patient factors, such as patient navigation or mailed outreach, and providers, such as EHR reminders, both of which can be feasible and cost-effective.^[105]

However, a better understanding of the longitudinal impact of such services is required before they can be applied to a generalized system. Furthermore, novel methods for identifying high-risk patients must be developed. For example, biomarker-based surveillance is growing as a potential method of improving and targeting efforts to improve adherence.^[105]

LIVER TRANSPLANTATION

The problem

The AASLD guidelines categorize indications for LT; however, there are no standardized criteria for what merits a patient to be referred to or listed for LT.^[106] Yilma et al^[107] showed that <30% of eligible people are referred for LT. Once referred, LT centers vary in their processes for determining which patients will undergo a formal LT evaluation. Although the full LT evaluation process is similar across centers (eg, hepatology and surgical evaluation, cardiac testing, and social work assessment), the order, length of workflow, and method of evaluation vary widely. Some centers have all referred patients undergo a full evaluation, while others perform a limited evaluation (eg, hepatology, labs, and imaging) to identify which patients will then have a full evaluation. This variability in committee processes and structures is a potential source of the disparity in waitlisting. Data also suggest that when compared to non-Hispanic White patients, non-Hispanic Black patients and Hispanic patients are less likely to be waitlisted for LT due to less access to health care, lower SES/high-poverty neighborhoods, and lower health literacy.^[108–111] However, these studies relied on population-level data, which define the denominator who could be waitlisted based on census or mortality data. Therefore, there are limited data to quantify the magnitude of these disparities in waitlisting because (a) there is no national database of patients with DC in contrast to patients with end-stage renal disease; (b) there is no mandated reporting of LT referral and evaluation data; (c) there are limited data from LT committee meetings because of the sensitive and confidential nature of committee decision-making; and (d) data on the number of potentially eligible patients for LT that are not placed on the waitlist is limited.^[107,112]

Furthermore, although Black patients have nearly 3 times the rate of end-organ failure compared to White patients, they comprise only 20% of recipients of LT, resulting in thousands of preventable patient deaths each year in the United States.^[113,114] Moreover, even after LT, disparities persist in post-LT outcomes.^[4,115,116] For example, in a 2002 analysis of the united network for organ sharing database, Black patients had lower graft survival (68% Black vs. 74% White) but also had a 36% increased risk of mortality at 2 years.^[117] This disparity

remained in an updated analysis from the 2002–2018 united network for organ sharing data set, which showed that Black patients still had a 15% post-LT higher mortality rate than White patients.^[118]

System-level changes

For LT centers, several important considerations may attenuate disparities and improve access to the waitlist and receipt of a transplant.^[7] There is clear evidence that the use of culturally competent interventions such as language interpreters and patient navigators from representative populations to address the specific needs of patients with diverse ethnic, linguistic, and cultural backgrounds is important.^[119] Thus, centers that are aware of the demographic characteristics of their regional population of patients with CLD can intervene with referring providers and patient populations using tailored approaches and, as a result, are more likely to facilitate access to LT among traditionally vulnerable patient groups.^[120] In the context of the known barriers faced by minority populations regarding LT, it is critical that we develop systems to increase our donor pool to mitigate the already significant exacerbations of known disparities. Given the complexities of the organ allocation process, centers that can also understand and efficiently manage organ offers for their waitlisted population are more likely to efficiently utilize scarce donor organs and facilitate LT opportunities. This includes understanding the readiness of patients on the waitlist and matching potential donor quality (eg, donors after cardiac death or donors with active infections such as HCV) with appropriate candidates at the time of offer. The benefits of LT for donors with certain risk factors should be effectively communicated to patients with diverse backgrounds and medical mistrust to facilitate effective shared decision-making. This also applies to living donor liver transplantation, which may be an important option for patients with vulnerable characteristics and attenuates longer wait times in access to LT. Finally, LT programs should communicate access to financial resources that are available to patients undergoing LT, such as the National Living Donor Assistance Center, who may qualify based on need.

Policy-level changes

Policy change is needed to address the impact of structural and institutional racism within LT. Initial policy change in LT was driven by the “Share 35” model, prioritizing organ donation to regional candidates with Model for End-Stage Liver Disease score ≥ 35 over local candidates to decrease mortality and prioritize the sickest patients first, regardless of background.^[121] Although it intended to

address disparities, there have been mixed results from this policy change, suggesting that disparities in transplant-associated outcomes still exist between social groups. Beyond focusing on allocation, potential areas to be addressed include how equity is created in recipient and donor identification. Improving data systems to identify patients for referral and resources for referral providers and LT centers to manage potential LT populations are system-level metrics that can align incentives to improve the health of patients with CLD early in their diagnosis. An extension of improved identification of potential LT eligibility among patients with CLD is an “opt-out” for referral policy.^[122] This model has been proposed for eligible patients with late-stage chronic and end-stage kidney disease and aims to expedite referrals to transplantation for patients who meet the eligibility criteria. This policy may be particularly effective among patients with historically low referral rates by using objective criteria to induce a referral rather than relying on proactive steps among patients and referring caregivers.^[123–126]

Knowledge gaps

The current process of LT committee decision-making can lead to bias (implicit or explicit), which may be further exacerbated when the committee structure does not represent the population receiving care. The current LT committee structure focuses on expertise/job descriptions (eg, surgery and hepatology) but not diversity (eg, gender and race/ethnicity) or affiliation with the institution. Just as the Department of Health and Human Services (HHS) mandates that institutional review boards must ensure gender diversity and that a member that is not affiliated with the institution, HHS mandates that LT committees have community members that reflect the patient population in the catchment of an LT center.^[127] Furthermore, poor utilization of donated livers in the face of health disparities in access to LT is a tragedy.^[128] Several donor types (donation after circulatory death grafts, steatotic grafts, and older donor livers) have declined or slow uptake is largely related to provider and system barriers, such as technical expertise, concerns about donor safety, and program liability.^[129] Organ procurement organizations have not readily offered these livers; however, a better understanding of how these valuable resources are diverted away from potential utilization is warranted, as fundamentally if the pool was to grow, this would increase the likelihood of marginalized populations also receiving a critical transplant. These issues may be impacted by innovations in assessment metrics and changes to procurement protocols. Regulatory metrics assessing organ placement at the organ procurement organization level and measuring organ offer acceptance at the LT center have significant promise in inducing behavioral changes that lead to more offered

and transplanted livers with the opportunity to reduce waitlist mortality while increasing LT volumes. Furthermore, novel advancements, such as ex vivo liver perfusion or using medical assistance in dying organs, may also help programs to better address the needs of their entire waitlist by improving the organ supply.^[130,131] However, as these initiatives are developed and extended to broader population groups, there is a gap in understanding how they impact equitable patient outcomes, which must be considered in future studies exploring these methodologies.

PALLIATIVE CARE

The problem

Owing to the high mortality rate and associated complications of CLD, palliative care (PC) is a critical component of providing high-quality care. PC is a holistic form of care oriented toward improving the quality of life of patients and their families, with a focus on comprehensively addressing physical, psychological, spiritual, and practical needs.^[132] Such care can be delivered by subspecialty-trained teams (specialty PC) or primary providers, such as hepatologists, gastroenterologists, and primary care teams; however, it is rarely offered to patients with CLD.^[133,134] Patients with DC and HCC experience a profound burden of uncertainty, financial toll, stigma, and physical and psychological symptoms, with many symptoms unrelated to portal hypertension, and thus are often left undertreated.^[135] Racial and ethnic minorities appear to experience a wide variance in receiving PC services. Black patients are less likely to die at home than White patients and are less likely to receive PC during terminal hospitalizations.^[136] Advanced care planning and serious illness communication are evidence-based interventions that improve the likelihood that care received at the end of life is consistent with the patient's stated wishes and has been shown to improve the quality of communication, as well as patient and caregiver experience while reducing readmission rates given how poorly patients do with admission. Although^[137–139] there is no direct evidence of racial/ethnic disparities in advanced care planning in the cirrhotic population, significant differences in documentation and conversations exist for older adults, with Black and Hispanic families tending to have more gaps.^[140]

System level

Cross-education among teams caring for patients with CLDs is critical. Gaps in PC competencies among transplant hepatology and gastroenterology trainees

have been highlighted, and similar gaps likely exist between transplant surgery (PC educational gaps) and PC (hepatology and transplant educational gaps) training programs and require inquiry.^[16,92] Tailored educational opportunities offered by professional societies and interdisciplinary training opportunities can help promote a shared and consistent mental model of how to care for these patients. In addition, ensuring that hepatology teams and individual clinicians have sufficient resources to deliver PC to their patients, whether that means honing their primary PC skills or having systems in place to ensure access to specialty PC, is critical. Lastly, developing novel models of care across multiple, diverse health care settings is the next step toward ensuring that PC can be delivered in a consistent and equitable fashion.

Policy level

Engagement outside of health care systems will be needed to ensure the integration of adequate hospital resourcing, and PC in practice is implementable, equitable, and sustainable. Payers and policymakers will require evidence that patient-centered care models can benefit patients and families in a way that promotes value and efficiency. Engagement with patients and caregivers in efforts to promote equity should ideally occur across all key focus areas; however, particular alignment with patient advocacy groups and subspecialty societies on common missions and goals is critical for ensuring that cultural change moves toward care delivery that is patient-centered and family-centered.

Knowledge gaps

The recent AASLD practice guidelines regarding PC have highlighted limited interventional trials that can provide high-grade evidence for the support of specific interventions in this population, a challenge given the nature of PC as well as the complexity of often acute management in DC. Beyond the interventions themselves, measures of efficacy must be standardized to ensure that progress is validated and reliable. Parallels can be drawn to other nonmalignant palliative diseases, such as end-stage chronic obstructive lung disease, where palliative scales for dyspnea are currently being evaluated to optimize symptomatic oxygen support. The management of ascites presents a similar specific and distinctive burden that must be objectified and standardized for better palliative support.^[141] As these measures are standardized, it is critical to focus on how disparities in sociodemographics are impacted regarding these outcomes, such as whether treatment for ascites is delayed or reduced in minority populations, given that similar results have been found in therapeutic interventions.^[112]

FUTURE DIRECTIONS

Future work toward reducing disparities will likely depend on a multidisciplinary approach with social (government) and medical interventions intertwining together and investing in SDOH to improve CLD population health (Figure 2). From a research perspective, addressing disparities in CLD outcomes begins with reassessing how we view variables in disparity research, along with implementing innovative research and interventions to address disparities. As we evaluated disparities along the continuum of care for CLD, we were able to identify broad directions for future improvement:

- (1) Early-stage disease concerns revolve around inadequate screening, be it for MASLD and ArLD in the general population or viral hepatitis in the at-risk population:
 - a) Although screening guidelines are often well established, the future of equitable care in these fields necessitates an influx of investment and attention toward quality improvement, utilizing the tools and technology available to bring our true performance toward the ideal standard.
- (2) As liver disease progresses to later stages, we must consider the known and significant disparities in outcomes when making decisions regarding how to best provide care for patients with cirrhosis and/or HCC:
 - a) Research must follow this lead, with a focus on understanding individual patient experiences to identify ways to better support patients and their caregivers.
 - b) We must also re-evaluate our inpatient protocols to standardize and optimize inpatient management for consistency regardless of patient background.
- (3) The capacity of our LT system must continuously be audited, as it remains a critical differentiator in access to a life-saving intervention:
 - a) It is no longer enough to measure the rate and outcomes of LT; instead, we must investigate how these transplants are decided, who determines allocation, and whether we truly consider equitable care in our decision-making.
 - b) When patients require palliation, our measures of care must consider not only the patient's experience but also how that experience is shaped by a patient's personal and cultural lived experience.
- (4) Race has become a visual proxy for the SDOH. We must include race as a lens but look to further

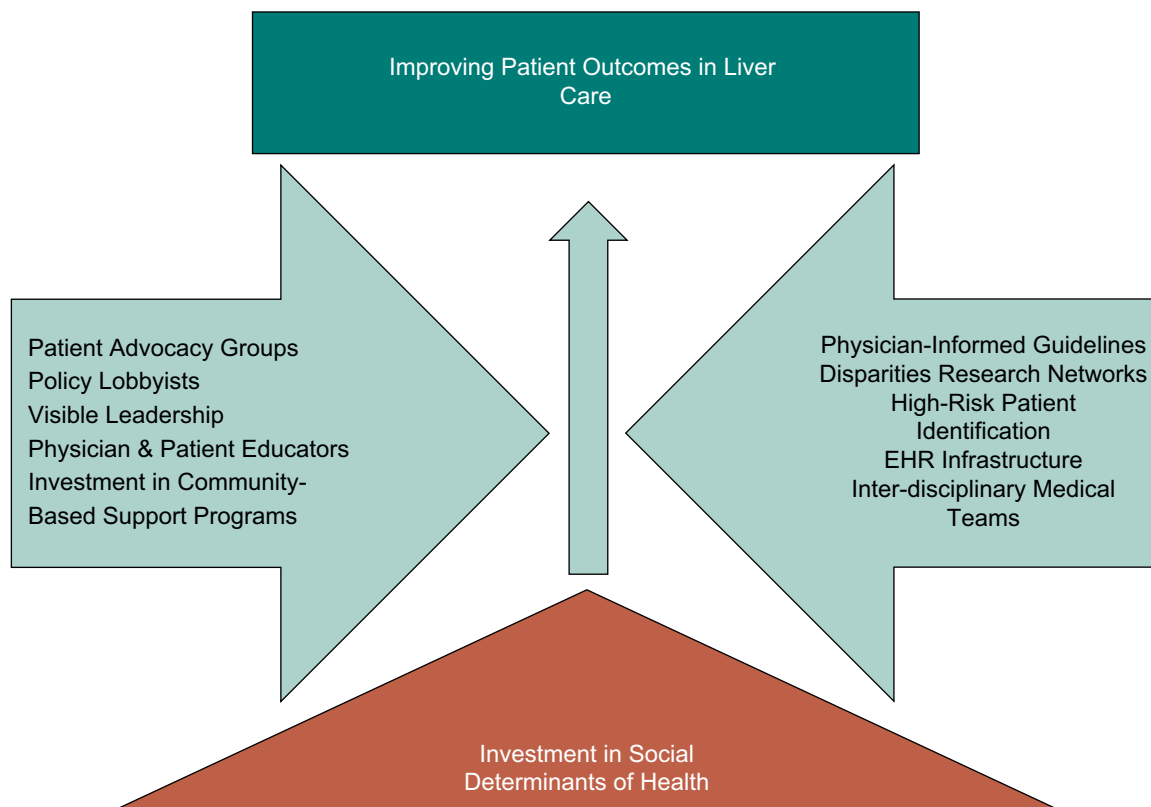


FIGURE 2 Social-medical approach to addressing health care disparities in CLD.

characterize populations regarding the significant SDOH that are interdependent with race to create the patient's lived experience.^[142–145]

- a) Defining race at the time of study design and the analyses must be designed to accurately reflect the impact race has on health; recognizing race is a social construct that acts distally on the more proximate SDOH.

Finally, we recognize that these efforts are issues beyond a single individual and necessitate the forces of the large advocacy bodies that represent hepatologists on a global level. AASLD, ALEH, EASL, and APASL can also reduce disparities through levers in 2 major areas: clinical care and the workforce. By offering programming on health disparities, including Special Interest Group programs, societies can also recognize disparities as a research and abstract category at annual meetings and fund abstract awards and pilot grants focused on disparity research. Furthermore, societally affiliated journals must prioritize equitable care to drive engagement and interest within this critical line of care. For example, the recognition of disparities at the journal level through the appointment of a dedicated editor across journals would spur a reputable profile of quality research in the field. Ultimately, through a combination of individual efforts, advocacy, and continued efforts by the broader organizations

supporting hepatologists and our patients, we can progress toward delivering change at a greater scale and pace when collaborating with regional and national policymakers.

CONCLUSIONS

The roots of health care disparities are complex; therefore, multifaceted, patient-centered solutions are required to improve care throughout the CLD care continuum. Making changes to improve equity is a critical but challenging endeavor. The intent of this review is to offer a pragmatic theory-driven approach for clinicians and organizations to augment their efforts in ways that will allow them to improve the quality and equity of care in patients with CLD regardless of disease etiology or place on the care continuum.

AUTHOR CONTRIBUTIONS

All authors take responsibility for the accuracy of the manuscript, have final authority over manuscript preparation, and the decision to submit the manuscript for publication. All the authors have approved the manuscript.

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